Final FA 24A Telecommunication Systems Engineering Tasks

	AOC 24A – Telecommunications Engineer
1	Title: Engineer Commercial and other telecommunication systems into an interoperable network. Condition: Given subscriber service requirements, subscriber locations, resource list (equipment, personnel, budget), and the applicable references. Standard: Is met when all subscriber requirements have been met and the commander approves network diagram. Performance Steps: Translate subscriber requirements into technical requirements (Voice, Data, Video, Special) . Assess site/physical location. Determine switching requirements (ATM, Intelligent Muxes, Switches, Routers). Develop switching plan. Determine transmission requirements (Copper, Fiber, Satellite, Tropo, LOS Microwave, Packet Radio, Cellular). Develop transmission plan. Determine ancillary requirements (HVAC, Power Distr., Grounding, EMI, Security and Crypto, Timing and Synchronization, and Interfaces). Incorporate ancillary requirements into transmission and switching plans. Produce draft network diagram. Develop system metrics (switching, transmission, ancillary, user services) Analyze network plan to ensure user requirements and inter operability standards are met. Submit final network plan for approval. (Statement of Work, (SOW), Telecommunication Service Order (TSO), Request for Proposal (RFP), Engineering Change Proposal (ECP), Rough Order of Magnitude (ROM) Request for Service (RFS)). Performance Measures: Developed switching plan IAW user requirements and resource availability. Developed transmission plan IAW user requirements and resource availability. Developed draft network diagram IAW switching, transmission and ancillary requirements. Developed system metrics (switching, transmission, ancillary, user services). Developed final network plan IAW user requirements and resource availability. References: Vendor Manuals, Title 47 US Code, EIA/TIA Standards, ITU-T and ITU-R Standards, etc Equipment: C, Ku, and Ka Band Satellite Terminals; Alcatel Microwave Systems (DS1, 4xDS1, DS3), VHF and UHF Radio Systems; Automatic Link Establishment (ALE) HF Radio Systems; Analog and Digital Cellular Phone Systems; ATM switches, IDNX Intelligent Muxes, CODEMs, CISCO Routers; CSU/DSU; Picturetel VTC Systems; PBX's and Key Systems; Analog and Digital Phones

Final FA 24A Telecommunication Systems Engineering Tasks

2	Title: Monitor compliance to a commercial telecommunications network design. Condition: Given an approved commercial telecommunications network design and implementation plan. Standard: Is met when the network is implemented IAW design specifications. Performance Steps: Review network design specifications. Review implementation plan. Review system metrics (measurable hands-on system performance standards). Verify implementation IAW network design specifications, implementation plan and system metrics. Initiate action to correct deficiency. Performance Measure: Initiated corrective action to network deficiency. References: Vendor Manuals, Title 47 US Code, EIA/TIA Standards, ITU-T and ITU-R Standards, etc Equipment: C, Ku, and Ka Band Satellite Terminals; Alcatel Microwave Systems (DS1, 4xDS1, DS3), VHF and UHF Radio Systems; Automatic Link Establishment (ALE) HF Radio Systems; Analog and Digital Cellular Phone Systems; ATM switches, IDNX Intelligent Muxes, CODEMs, CISCO Routers; CSU/DSU; Picturetel VTC Systems; PBX's and Key Systems; Analog and Digital Phones

Final FA 24A Telecommunication Systems Engineering Tasks

3	Title: Validate a commercial telecommunications network. Condition: Given an operational commercial telecommunications network; network design plan; test, measurement, and diagnostic equipment (TMDE), and applicable regulations and commercial standards. Standard: Is met when a commercial telecommunications network meets user requirements and applicable regulatory standards. Performance Steps: Review network design specifications. Review system metrics (transmission, switching, user services, ancillary). Review implementation plan. Develop System Acceptance Test Plan. Supervise System Acceptance Test (SAT). Review System Acceptance Test results. Initiate corrective action. Certify network performance. Performance Measures: Developed System Acceptance Test Plan IAW design specification, system metrics and systems implementation plan. Initiated corrective action IAW System Acceptance Test Report. Certified network performance IAW System Acceptance Test Report. References: Vendor Manuals, Title 47 US Code, EIA/TIA Standards, ITU-T and ITU-R Standards, etc Equipment: C, Ku, and Ka Band Satellite Terminals; Alcatel Microwave Systems (DS1, 4xDS1, DS3), VHF and UHF Radio Systems; Automatic Link Establishment (ALE) HF Radio Systems; Analog and Digital Cellular Phone Systems; ATM switches, IDNX Intelligent Muxes, CODEMs, CISCO Routers; CSU/DSU; Picturetel VTC Systems; PBX's and Key Systems; Analog and Digital Phones

Final FA 24A Telecommunication Systems Engineering Tasks

4	Title: Restore a commercial telecommunications network. Condition: Given non-operational or degraded services of a commercial telecommunications network; network design plan; test, measurement, and diagnostic equipment (TMDE); applicable regulations; and commercial standards. Standard: Is met when services are restored to design plan/specifications. Performance Steps: Verify problem. Analyze problem. Determine possible causes of problem. Develop troubleshooting plan. Execute troubleshooting plan. Engineer solution to outage. Direct the implementation of the solution. Validate implementation of solution. Document the solution. Performance Measures: Planned troubleshooting procedures to isolate fault. Executed troubleshooting procedures to isolate fault. Validated implementation of solution to design plan/specifications. Documented solution. References: Vendor Manuals, Title 47 US Code, EIA/TIA Standards, ITU-T and ITU-R Standards, etc Equipment: C, Ku, and Ka Band Satellite Terminals; Alcatel Microwave Systems (DS1, 4xDS1, DS3), VHF and UHF Radio Systems; Automatic Link Establishment (ALE) HF Radio Systems; Analog and Digital Cellular Phone Systems; ATM switches, IDNX Intelligent Muxes, CODEMs, CISCO Routers; CSU/DSU; Picturetel VTC Systems; PBX's and Key Systems; Analog and Digital Phones

Final FA 24A Telecommunication Systems Engineering Tasks

5	Title: Engineer TRI-TAC and other telecommunication systems into an inter operable network. Condition: Given subscriber service requirements, subscriber locations, a TRI-TAC resource listing (equipment, personnel, budget), and applicable references. Standard: Is met when all subscriber requirements have been met and the commander approves the network diagram. Performance Steps: Translate subscriber requirements into technical requirements. Assess site/physical location. Determine switching requirements. Develop Switching plan. Determine transmission requirements. Develop transmission plan. Determine ancillary requirements. Incorporate ancillary requirements into transmission and switching plans. Produce draft network diagram. Develop system metrics (switching, transmission, ancillary, user services) Analyze network plan to ensure user requirements and inter operability standards are met. Submit final network plan for approval. (Statement of Work, (SOW), Telecommunication Service Order (TSO), Request for Proposal (RFP), Engineering Change Proposal (ECP), Rough Order of Magnitude (ROM) Request for Service (RFS)). Performance Measures: Developed switching plan IAW user requirements and resource availability. Developed transmission plan IAW user requirements and resource availability. Developed draft network diagram IAW switching, transmission and ancillary requirements. Developed system metrics (switching, transmission, ancillary, user services) Developed final network plan IAW user requirements and resource availability. References: Technical Manuals pertaining to below equipment. Equipment: AN/TRC-170, 173, 174, 175, 138, AN/TTC-39D, 39D(P/S), AN TTC-48 SEN, 47 LEN, RMC-RLGM, DSVT, DNVT, CSCE (ISYSCON), TSC-93, 85, FCC-100, TYC-39A, AN/TRC-191, RT-1539.

Final FA 24A Telecommunication Systems Engineering Tasks

6	Title: Monitor compliance to a TRI-TAC telecommunications network design. Condition: Given an approved TRI-TAC telecommunication network design and implementation plan. Standard: Is met when the TRI-TAC network is implemented IAW design specifications. Performance Steps: Review network design specifications. Review Implementation plan. Review system metrics (measurable hands-on system performance standard) Verify implementation IAW network design specifications, implementation plan and system metrics. Initiate action to correct deficiency. Performance Measure: Initiated corrective action to network deficiency. References: Technical Manuals pertaining to below equipment. Equipment: AN/TRC-170, 173, 174, 175, 138, AN/TTC-39D, 39D(P/S), AN TTC-48 SEN, 47 LEN, RMC-RLGM, DSVT, DNVT, CSCE (ISYSCON), TSC-93, 85, FCC-100, TYC-39A, AN/TRC-191, RT-1539.

Final FA 24A Telecommunication Systems Engineering Tasks

7	Title: Validate a TRI-TAC telecommunications network. Condition: Given an operational TRI-TAC telecommunications network; network design plan; test, measurement, and diagnostic equipment (TMDE); and applicable regulations and standards. Standard: Is met when a TRI-TAC telecommunications network meets user requirements and applicable regulatory standards. Performance Steps: Review network design specifications. Review system metrics (transmission, switching, user services, ancillary). Review implementation plan. Develop System Acceptance Test Plan. Supervise System Acceptance Test. Review System Acceptance Test results. Initiate corrective action. Certify network performance. Performance Measures: Developed System Acceptance Test Plan IAW design specification, system metrics and Systems implementation plan. Initiated corrective action IAW System Acceptance Test Report. Certified network performance IAW System Acceptance Test Report. References: Technical Manuals pertaining to below equipment. Equipment: AN/TRC-170, 173, 174, 175, 138, AN/TTC-39D, 39D(P/S), AN TTC-48 SEN, 47 LEN, RMC-RLGM, DSVT, DNVT, CSCE (ISYSCON), TSC-93, 85, FCC-100, TYC-39A, AN/TRC-191, RT-1539.

Final FA 24A Telecommunication Systems Engineering Tasks

8	Title: Restore a TRI-TAC telecommunications network Condition: Given non-operational or degraded services of a TRI-TAC telecommunications network; network design plan; test, measurement, and diagnostic equipment (TMDE); applicable regulations; and standards. Standard: Is met when services are restored to design plan/specifications. Performance Steps: Verify problem. Analyze problem. Determine possible causes of problem. Develop troubleshooting plan. Execute troubleshooting plan. Engineer solution to outage. Direct the implementation of the solution. Validate implementation of solution. Document the solution. Performance Measures: Planned troubleshooting procedures to isolate fault. Executed troubleshooting procedures to isolate fault. Validated implementation of solution to design plan/specifications. Documented solution. References: Technical Manuals pertaining to below equipment. Equipment: AN/TRC-170, 173, 174, 175, 138, AN/TTC-39D, 39D(P/S), AN TTC-48 SEN, 47 LEN, RMC-RLGM, DSVT, DNVT, CSCE (ISYSCON), TSC-93, 85, FCC-100, TYC-39A, AN/TRC-191, RT-1539.

Final FA 24A Telecommunication Systems Engineering Tasks

9	Title: Engineer MSE and other telecommunication systems into an interoperable network. Condition: Given subscriber service requirements, subscriber locations, a MSE resource listing (equipment, personnel, budget), and the applicable references. Standard: Is met when all subscriber requirements have been met and commander approves the MSE network diagram. Performance Steps: Translate subscriber requirements into technical requirements. Assess site/physical location. Determine switching requirements. Develop Switching plan. Determine transmission requirements. Develop transmission plan. Determine ancillary requirements. Incorporate ancillary requirements into transmission and switching plans. Produce draft network diagram. Develop system metrics (switching, transmission, ancillary, user services) Analyze network plan to ensure user requirements and inter operability standards are met. Submit final network plan for approval. (Statement of Work, (SOW), Telecommunication Service Order (TSO), Request for Proposal (RFP), Engineering Change Proposal (ECP), Rough Order of Magnitude (ROM) Request for Service (RFS)). Performance Measures: Developed switching plan IAW user requirements and resource availability. Developed transmission plan IAW user requirements and resource availability. Developed draft network diagram IAW switching, transmission and ancillary requirements. Develop system metrics (switching, transmission, ancillary, user services) Developed final network plan IAW user requirements and resource availability. References: DA Form 2406, Dead Line Report, Applicable TMs Equipment: AN/TTC-46, 47, 48, AN/TRC-190, V1, 2, 3, 4, (SHF), AN/TRC-191, AN/VRC-97, SHF, RMC, DSVT, DNVT, NPT/ISYSCON, TSC-93, 85, DMS, Tactical Internet (TI), UXC-7.

10	Title: Monitor compliance to a MSE telecommunications network design. Condition: Given an approved MSE telecommunication network design, and implementation plan. Standard: Is met when the MSE network is implemented IAW design specifications. Performance Steps: Review network design specifications. Review Implementation plan. Review system metrics (measurable hands-on system performance standard) Verify implementation IAW network design specifications, implementation plan and system metrics. Initiate action to correct deficiency (ies). Performance Measures: Initiated action to correct network deficiency (ies). References: DA Form 2406, Dead Line Report, Applicable TMs Equipment: AN/TTC-46, 47, 48, AN/TRC-190, V1, 2, 3, 4, (SHF), AN/TRC-191, AN/VRC-97, SHF, RMC, DSVT, DNVT, NPT/ISYSCON, TSC-93, 85, DMS, Tactical Internet (TI), UXC-7.

Final FA 24A Telecommunication Systems Engineering Tasks

11	Title: Validate a MSE telecommunications network. Condition: Given an operational MSE telecommunications network; network design plan; test, measurement, and diagnostic equipment (TMDE), and applicable regulations and standards. Standard: Is met when a MSE telecommunications network meets user requirements and applicable regulatory standards. Performance Steps: Review network design specifications. Review system metrics (transmission, switching, user services, ancillary). Review implementation plan. Develop System Acceptance Test Plan. Supervise System Acceptance Test. Review System Acceptance Test results. Initiate corrective action. Certify network performance. Performance Measures: Developed System Acceptance Test Plan IAW design specification, system metrics and systems implementation plan. Initiated corrective action IAW System Acceptance Test Report. Certified network performance IAW System Acceptance Test Report. References: DA Form 2406, Dead Line Report, Applicable TMs Equipment: AN/TTC-46, 47, 48, AN/TRC-190, V1, 2, 3, 4, (SHF), AN/TRC-191, AN/VRC-97, SHF, RMC, DSVT, DNVT, NPT/ISYSCON, TSC-93, 85, DMS, Tactical Internet (TI), UXC-7.

12	Title: Restore a MSE telecommunications network. Condition: Given non-operational or degraded services of a MSE telecommunications network; network design plan; test, measurement, and diagnostic equipment (TMDE); applicable regulations; and standards. Standard: Is met when services are restored to design plan/specifications. Performance Steps: Verify problem. Analyze problem. Determine possible causes of problem. Develop troubleshooting plan. Execute troubleshooting plan Engineer solution to outage Direct the implementation of the solution Validate implementation of solution Document the solution. Performance Measures: Planned troubleshooting procedures to isolate fault. Executed troubleshooting procedures to isolate fault. Validated implementation of solution to design plan/specifications. Documented solution. References: DA Form 2406, Dead Line Report, Applicable TMs Equipment: AN/TTC-46, 47, 48, AN/TRC-190, V1, 2, 3, 4, (SHF), AN/TRC-191, AN/VRC-97, SHF, RMC, DSVT, DNVT, NPT/ISYSCON, TSC-93, 85, DMS, Tactical Internet (TI), UXC-7.

Final FA 24A Telecommunication Systems Engineering Tasks

13	Title: Engineer Warfighter Information Network – Tactical (WIN-T) and other telecommunication systems into an interoperable network. Condition: Given subscriber service requirements, subscriber locations, a WIN-T resource listing (equipment, personnel, budget), and the applicable references. Standard: Is met when all subscriber requirements have been met and commander approves the WIN-T network diagram. Performance Steps: Translate subscriber requirements into technical requirements. Assess site/physical location. Determine switching requirements. Develop Switching plan. Determine transmission requirements. Develop transmission plan. Determine ancillary requirements. Incorporate ancillary requirements into transmission and switching plans. Produce draft network diagram. Develop system metrics (switching, transmission, ancillary, user services) Analyze network plan to ensure user requirements and inter operability standards are met. Submit final network plan for approval. (Statement of Work, (SOW), Telecommunication Service Order (TSO), Request for Proposal (RFP), Engineering Change Proposal (ECP), Rough Order of Magnitude (ROM) Request for Service (RFS)). Performance Measures: Developed switching plan IAW user requirements and resource availability. Developed transmission plan IAW user requirements and resource availability. Developed draft network diagram IAW switching, transmission and ancillary requirements. Develop system metrics (switching, transmission, ancillary, user services). Developed final network plan IAW user requirements and resource availability. References: Equipment:

14	Title: Monitor compliance to a WIN-T telecommunications network design. Condition: Given an approved WIN-T telecommunication network design, and implementation plan. Standard: Is met when the WIN-T network is implemented IAW design specifications. Performance Measures: Review network design specifications. Review Implementation plan. Review system metrics (measurable hands-on system performance standard) Verify implementation IAW network design specifications, implementation plan and system metrics. Initiate action to correct deficiency. Performance Measures: Initiated corrective action to network deficiency. References: Equipment:

15	Title: Validate a WIN-T telecommunications network. Condition: Given an operational WIN-T telecommunications network; network design plan; test, measurement, and diagnostic equipment (TMDE); applicable regulations; and standards. Standard: Is met when a WIN-T telecommunications network meets user requirements and applicable regulatory standards. Performance Steps: Review network design specifications. Review system metrics (transmission, switching, user services, ancillary). Review implementation plan. Develop System Acceptance Test Plan. Supervise System Acceptance Test. Review System Acceptance Test results. Initiate corrective action. Certify network performance. Performance Measures: Developed System Acceptance Test Plan IAW design specification, system metrics and systems implementation plan. Initiated corrective action IAW System Acceptance Test Report. Certified network performance IAW System Acceptance Test Report. References: Equipment:

16	Title: Restore a WIN-T telecommunications network. Condition: Given non-operational or degraded services of a WIN-T telecommunications network; network design plan; test, measurement, and diagnostic equipment (TMDE); applicable regulations; and standards. Standard: Is met when services are restored to design plan/specifications. Performance Steps: Verify problem. Analyze problem. Determine possible causes of problem. Develop troubleshooting plan. Execute troubleshooting plan Engineer solution to outage Direct the implementation of the solution Validate implementation of solution Document the solution. Performance Measures: Planned troubleshooting procedures to isolate fault. Executed troubleshooting procedures to isolate fault. Validated implementation of solution to design plan/specifications. Documented solution. References: Equipment:

In order to accomplish the above tasks, job holders have the following knowledge and skills:

a. Use test equipment including but not limited to: oscilloscopes, spectrum analyzers, protocol analyzers, transmission test sets (Bit Error Rate Testers, cable continuity testers, multimeters, etc.
b. Understand Communications Standards and how to apply them to communications system design and evaluation (ITU-T, ANSI, ISO, ATM Forum, IETF, etc.)
c. Must have thorough understanding of Data Communication terms and concepts: OSI model, Data Encoding, Local Area Networks and Interconnecting Devices (hubs, bridges, multiplexers, routers, etc.), WAN interfaces, message formats, etc.
d. Understand commercial technologies such as ATM, IDN or ISDN, SONET, Frame Relay, etc.)
e. Understand the functionality of and be able to program a router (preferable a Cisco Router).
f. Understand Network Management Concepts including the use of Network Management and Element Management Systems. A good understanding of SNMP and CMIP protocols would also be necessary.
g. Must have a solid foundation in Telecommunications. Should be able to understand basics of commercial voice switching network and related it to legacy communications network.
h. Understand different cable connectors: DB-25, DB-15, RJ-45, Telco-50
i. Should be able to build a cable with connectors listed in "k" (as a minimum).
j. Must be familiar with Joint communications systems and networks (architecture)

Must understand how to interface Joint, legacy (MSE, DGM) communications to COTS (Commercial-Off-The-Shelf) equipment.